Lymphocyte Cultures and FISH Analysis after Long-term Storage of Chernobyl Cleanup Worker Samples

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The aim was to establish optimal culture conditions for lymphocytes after long-term liquid nitrogen storage and to determine the frequency of translocations after fluorescence in situ hybridization (FISH) painting of samples from Estonian Chernobyl cleanup workers with average recorded doses of about 130 mSv. Lymphocyte samples from more than 2000 cleanup workers and controls have been stored at STUK in liquid nitrogen during 1995-1997. In the present study, 150 cell samples from exposed cleanup workers and population controls were thawed during 2004-2005 and cultured with routine methods. The most critical factors for successful cultures were: a) adequate freezing procedure of the samples, b) careful washing of cells to remove DMSO, c) cells kept in foetal serum after washing before cultures were set up, d) minimum cell density of 0.4 to 0.6 x 10^6 per ml in culture medium. More than 90% of the cultures were successful, i.e. the mitotic index and metaphase quality were adequate for FISH analysis. Chromosome aberrations from FISH painted slides were scored from 37 Estonian unexposed controls and 101 cleanup workers. One thousand metaphases were analysed per person. In preliminary analyses, the FISH translocation frequencies in the control group and the cleanup worker group were relatively similar. However, slightly higher translocation frequencies were observed among workers with recorded doses of more than 200 mSv. Results from regression analyses considering translocation yields with respect to age, exposure to ionizing radiation and smoking will be presented.

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